ENERGY $AVER$

"... For Business and Industry".

VOLUME TWO / NO. 4

LIGHTEN YOUR ELECTRICAL COSTS WITH ENERGY-EFFICIENT LAMPS

The Facts...

Lighting your hallways, corridors and lobbies with energy-efficient compact fluorescent lamps can save money and provide more light per unit of electrical energy used.

Compact fluorescent lighting is five to nine times more efficient than standard incandescent bulbs, making it an economical lighting source for many Alberta buildings. When higher wattage incandescent bulbs are replaced with lower wattage compact fluorescents, a significant reduction in energy consumption can be achieved.

With a rated lamp life of 10 000 hours (up to 10 times that of an incandescent bulb), the maintenance cost of replacing burned out lights is reduced substantially when compact fluorescent tubes are used. Also, building cooling costs will be less as lower wattage tubes give off less heat.

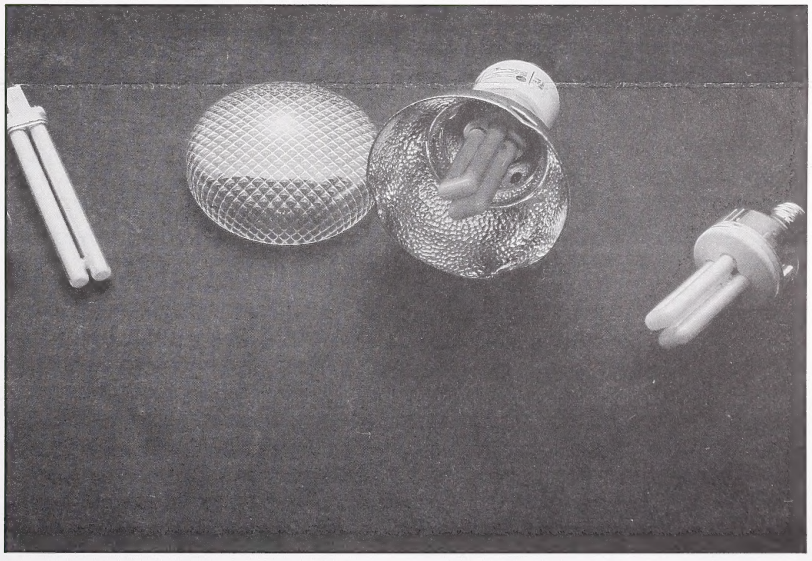
Sometimes referred to as mini-fluorescents or self-ballasted mini-fluorescents, compact fluorescent tubes consist of one or two glass cylinders bent into a U-tube, or two parallel tubes connected by a glass bridge. As with all fluorescent tubes, these need a specially designed ballast to operate. Often, this ballast is built in to the lamp base. Some compact fluorescents are designed for direct installation into existing incandescent sockets while others require an adapter.

Compact fluorescent tubes can be used in recessed fixtures, wall and ceiling mount fixtures, exit and directional signs, hallways, security lights, desk and task lighting, display lighting and difficult-to-access areas. Generally available in five- to 28-watt sizes, they can replace small incandescent bulbs of equivalent light output. Use of a reflector can increase light output by as much as 85 per cent, permitting replacement of even larger incandescent bulbs.

Available in both warm and cool colors, compact fluorescent tubes provide a pleasant light source which is difficult to distinguish from regular incandescents.

"Quad" compact fluorescents are essentially two compact fluorescents combined into one lamp, giving double the light output. Because of their compact size, they fit small fixtures. In addition, the design causes light to be emitted evenly, making it ideal for use in fixtures with conical reflectors.

A wide variety of fixtures for use with compact fluorescents are available, including indoor flood light and recessed fixtures which have reflectors and sockets that fit ceiling spot light units. The highly polished reflector



Compact fluorescent lamp selection.

redirects and concentrates the light to greatly increase efficiency. A removable lens cover allows access to the tubes for replacement and maintenance.

Efficiency and long life, combined with attractive fixtures, make compact fluorescent lamps an excellent means to efficiently use electrical energy. As building owners, managers and maintenance staff seek to reduce utility costs, it is likely the use of compact fluorescents will increase.

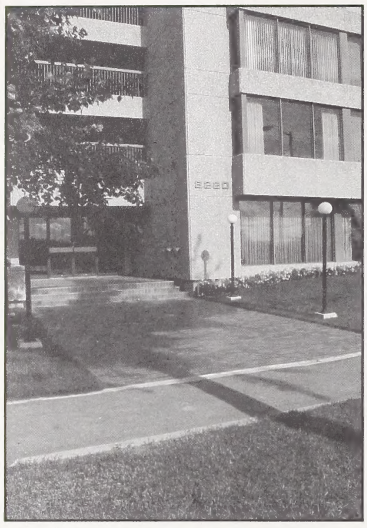
The Application...

River Park Place is a 51-suite high-rise condominium in Edmonton. Built in 1978, the 14-storey structure has 100 230 square feet (9320 square metres) of floor area.

In January 1983, an Alberta Energy Bus team conducted an energy audit. Several energy conservation measures have since been implemented by the condominium association. In particular, twenty-three 75-watt flood lights in the main lobby, front entrance and hallways were converted to 13-watt compact "quad" fluorescent fixtures, with appropriate reflectors and screw-in adapters to fit the existing spot light area. The result was economical and attractive and provided more light than the original incandescent units.

A re-audit of River Park Place was done in April 1988. The conversion to 13-watt compact fluorescent tubes had resulted in an annual savings of $550. With a total cost of $1035 for the new fixtures, the payback on the investment in compact fluorescents was about 1.9 years (capital cost divided by the annual savings).

In addition to the electrical savings, maintenance costs are less because the compact fluorescent tubes last five to 10 times longer than the incandescent bulbs, reducing the frequency of replacing burned out lights.



River Park Place, Edmonton

The Bottom Line...

A simple change-over to compact fluorescent tubes can help building owners and managers save on their annual electrical bill. The easiest method of determining the economic merits of converting to compact fluorescent tubes is by calculating the payback period. Anything in the order of two years or less is considered to be very good and worth implementing.

The accompanying graph (Figure 1) shows the potential annual savings that could be achieved by converting incandescent bulbs to the equivalent (in light output) compact fluorescents. The savings indicated are based on continuous operation – 168 hours per week. To use the graph, determine the lowest price block charged by your electrical utility that is applicable to your building, and then locate the point on the horizontal axis that is closest to this price. Next, read up to the line that represents the desired compact fluorescent tube conversion. (The compact fluorescent tube and incandescent bulb equivalents are shown in Table 1).

Then, read across to the left to find the electrical cost savings per year. If the lights are not operating continuously, divide the actual hours of operation per week by 168 and multiply by the savings per year (from the graph) to find the actual savings.

In addition to the savings based on electrical energy consumption, the change-over to compact fluorescents may provide electrical demand cost savings. Your electric utility company can assist you in determining demand cost. To calculate annual demand savings, multiply the appropriate kilowatt savings from Table 1 by the demand cost, times 12 months.

The example on page 3 will help to illustrate the savings calculations.

FIGURE 1

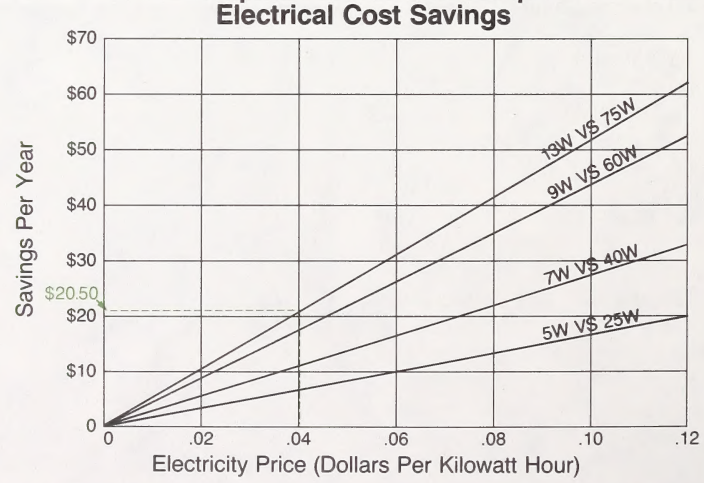


TABLE 1

Compact Fluorescent	Incandescent Approximate Equivalent	Kilowatt Savings
5 watts	25 watts	.02
7 watts	40 watts	.03
9 watts	60 watts	.05
13 watts	75 watts	.06

EXAMPLE

Convert an existing 75-watt incandescent bulb to a 13-watt compact fluorescent.
The lamp operates 100 hours per week.
The lowest applicable energy price is $0.04 per kW.h
The demand charge is $3.78 per kW
The lamp conversion cost $20.00

Annual electrical energy cost savings (using graph)
= $20.50 per lamp per year

Correction for hours of operation

$$= \frac{\text{100 hours per week}}{\text{168 hours per week}} \times \$20.50$$

= $12.20 per lamp per year

Annual electrical demand cost savings:

$$12 \frac{\text{months}}{\text{year}} \times .06 \text{ kW} \times \frac{\$3.78}{\text{kW/month}}$$

= $2.72 per year

Total annual electrical cost savings per lamp
= $14.92 per year ($12.20 + $2.72)

Simple Payback:

$$\frac{\$20 \text{ cost}}{\$14.92 \text{ savings}} \times 12 = 16 \text{ months}$$

SECTOR REVIEW

Energy Use and Potential for Savings in Large Residential Buildings

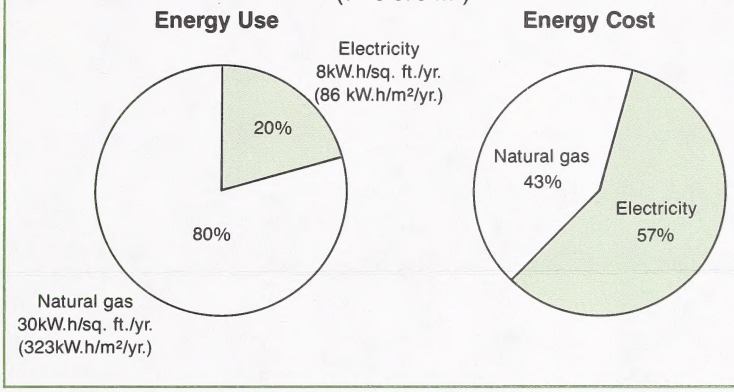
Energy use varies widely, depending on the type of building and the activities in that building. The extent of variation in energy use has become evident following Energy Bus audits of almost every type of facility in Alberta.

An energy audit initially determines how much energy is being used and how much it costs in each area. Energy conservation measures are then identified which should result in energy cost savings. On average, the Energy Bus has identified a potential reduction in energy costs of about 20 per cent.

Alberta's Energy Bus program has conducted audits in 146 large residential buildings such as apartments and condominium complexes, 54 of which are greater than 75 000 square feet (6 970 square metres). In these larger facilities, the identified potential for energy cost savings was about 22 per cent, mostly from no-cost and low-cost energy conservation measures.

FIGURE 2

Energy Use and Cost
Large Residential Buildings
(> 75 000 sq. ft.)
(> 6 970 m²)



Owners of large residential buildings can save energy by controlling energy use in common areas such as lobbies, hallways, stairwells and parkades and by encouraging residents to use energy wisely.

Figure 2 shows energy use (expressed in kilowatt hours per square foot and per square metre per year) and cost for natural gas and electricity in large residential buildings.

Electrical energy represents only about 20 per cent of total energy use compared with 80 per cent for natural gas. However, the cost of electricity used is 57 per cent of the total energy cost. This is because the average price of a unit of electrical energy is five-and-a-half times that of the equivalent unit of natural gas.

Figure 3 shows the energy use breakdown for large residential buildings. Of the total electrical use,

lighting represents 32 per cent.

Lighting accounts for a large portion of the energy use in this sector because lights in lobbies, hallways, stairwells and parkades operate continuously to maintain safety and security for residents. The use of energy-efficient light sources such as compact fluorescent tubes is the most practical option available to building operators for reducing lighting costs in such areas.

The potential for electrical savings in the five most recently audited facilities was $88 500 of which $39 150 is associated with lighting. This represents 44 per cent of the total electrical savings (30% + 14%) as shown in Figure 4. Of the total lighting savings, $12 800 or about 33 per cent ($12 800/$39 150 × 100) can be achieved with the use of compact fluorescents. Figure 4 also shows that the savings potential from compact fluorescent tubes is 14 per cent of the total electrical savings.

Figure 3

Energy Use in Large Residential Buildings

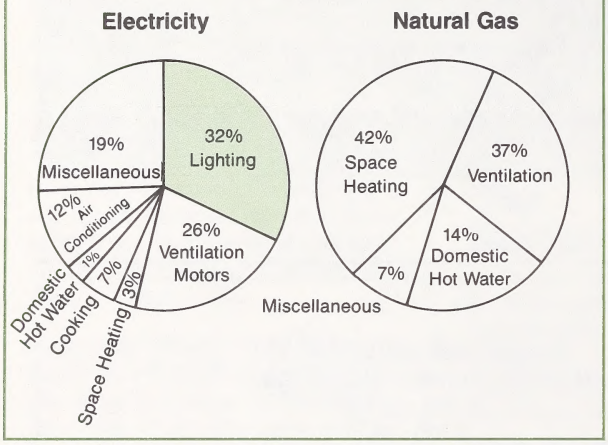
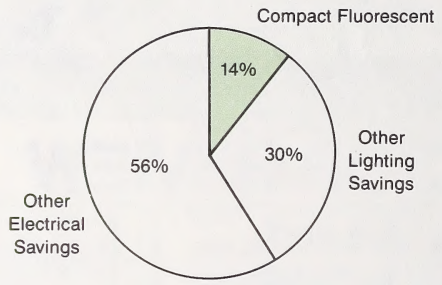


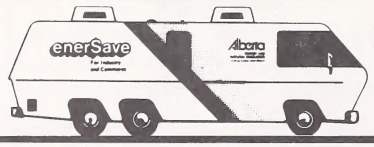
FIGURE 4

Potential Electrical Savings from Lighting



FOR MORE INFORMATION

The article Lighten Your Electrical Costs With Energy-Efficient Lamps was researched by David Supruniuk and the Sector Review was completed by Les Sladen. For detailed information on energy cost saving calculations and the energy audit database, contact the industrial section of the Energy Efficiency Branch: Phone 427-5200 (collect).



ENERGY $AVER$

Energy $aver$ is a series of fact sheets about energy conservation measures that have wide application in Alberta. Each issue highlights a different technology and its successful use in the province. The Sector Review summarizes energy use patterns of different facilities that have used the Alberta Energy Bus audit service. Comments, questions and suggestions are welcome.

Write or phone (collect) to be placed on the mailing list. You may also obtain Energy $aver$ back issues or arrange for an Energy Bus audit (conducted at no charge).

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